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Septic metastatic endophthalmitis complicating *Klebsiella pneumoniae* liver abscess in a non-diabetic Chinese man

非糖尿病華裔男性患上肺炎克雷白桿菌肝膿腫而併發的膿毒性轉移眼內炎

Septic metastatic endophthalmitis is a rare but serious disease. Endophthalmitis arising from *Klebsiella pneumoniae* liver abscess has been reported with diabetes mellitus as a major associated condition, but is rarely seen in patients without diabetes. A non-diabetic patient with liver abscess complained of right eye discomfort and floaters 3 days after admission. Both blood and liver aspirate cultured *Klebsiella pneumoniae*. The patient was treated initially with systemic and subconjunctival antibiotics followed by intravitreal antibiotics with successful visual salvation. Previous reports from the literature showed poor visual outcome despite treatment and delayed recognition was often the cause. Clinicians should be alert to endophthalmitis whenever a patient with *Klebsiella pneumoniae* liver abscess complains of ocular symptoms. Urgent ophthalmological assessment should be sought.

膿毒性轉移眼內炎是一種罕見但嚴重的疾病。過往的報告中曾有病例因肺炎克雷白桿菌而引致眼內炎，但這種情況通常出現在糖尿病患者中，在非糖尿病患者中發生卻非常罕見。一名患有肝膿腫的非糖尿病患者入院後三天，感覺右眼不適，並帶有浮腫。血和肝抽吸物都培養出肺炎克雷白桿菌。起初對患者使用全身和下結膜抗生素治療，接著用內玻璃體抗生素，成功挽救病人的視力。根據以往的文獻報告，往往由於治療和診斷太遲，治療後病人的視力不佳。臨床醫生要注意當肺炎克雷白桿菌患者有眼睛不適的徵兆，便應加以注意病人可能患上眼內炎，這時應及早作緊急眼科檢查。

Key words:
Endophthalmitis/diagnosis;
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關鍵詞：
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Introduction

Metastatic septic bacterial endophthalmitis is a rare but potentially devastating disease. The association of pyogenic liver abscess caused by *Klebsiella pneumoniae* and endophthalmitis is well described in several series.[1-5] We report on a local patient with endophthalmitis associated with liver abscess caused by *K pneumoniae* to highlight two clinical issues: first, the existence of such a clinical association; second, that timely management of the condition may improve the visual prognosis.

Case report

A 49-year-old Hong Kong Chinese man presented with acute hepatitis-like symptoms to the Infectious Disease Service at the Princess Margaret

Hospital in October 1999. He had a 2-day history of epigastric distension, vomiting, fever, chills, tea-coloured urine, and watery diarrhoea. His past health was unremarkable except for a duodenal ulcer. He was not diabetic and seldom drank alcohol.

He developed shock in the emergency department with a systolic blood pressure of 70 mm Hg and a diastolic blood pressure of 30 mm Hg, pulse rate of 105 beats per minute, and core temperature of 38.9°C. Normotension was promptly restored after intravenous fluid replacement. Physical examination showed jaundice and mildly tender hepatomegaly but was otherwise unremarkable.

Investigations showed that the white blood cell count was 10.1 x 10^9 /L (normal range, 3.2-9.8 x 10^9 /L) [93% neutrophils with left shift of neutrophils and toxic granulation seen], haemoglobin level was 13.2 g/L (normal range, 140-180 g/L), and platelet count was 52 x 10^9 /L (normal range, 150-450 x 10^9 /L). The serum bilirubin level was 115 mmol/L (normal range, 2-18 mmol/L), serum alkaline phosphatase level was 86 U/L (normal range, 30-120 U/L), and alanine transaminase level was 57 U/L (normal range, 0-35 U/L). Creatinine level was 205 mmol/L (normal range, 50-110 mmol/L). Spot glucose level was 9.0 mmol/L (normal range, 3.9-6.1 mmol/L) on admission. Blood culture taken on admission grew Gram negative bacilli on day 1 after admission.

The organism was subsequently identified as *K pneumoniae*, which was sensitive to cefuroxime, gentamicin, levofloxacin, and ampicillin-sulbactam, and resistant to ampicillin. Ultrasound examination showed a heterogeneous hypoechogenic hepatic lesion of 5 cm suggestive of liver abscess. An urgent computerised axial tomography scan of the abdomen confirmed the presence of a multiloculated liver abscess in the caudate lobe of the liver. Intravenous cefuroxime 750 mg 8 hourly and metronidazole 500 mg 6 hourly were commenced.

On day 3 after admission, the patient complained of sudden discomfort and floaters in his right eye. Visual acuity was 6/9 in the right eye and 6/6 in the left eye. Examination showed mild conjunctival injection in the right eye. Right anterior chamber cells of 4+ and 1 mm hypopyon were present. The anterior segment of the left eye was unremarkable. Intraocular pressure was 10 mm Hg in the right eye and 18 mm Hg in the left eye. Fundal examination of the right eye showed vitreous haze 1+, peripapillary retinal haemorrhage, and Roth's spot. An elevated, dome-shaped, yellowish white subretinal mass, measuring approximately 10 mm in diameter, was noted in the upper temporal quadrant of the posterior pole of the right fundus.

The diagnosis of right septic metastatic endophthalmitis was made. The patient had already started intravenous cefuroxime, and was given subconjunctival cefuroxime 125 mg and gentamicin 20 mg once daily, and topical homatropine 4% twice daily. The anterior chamber reaction and vitreous clarity were monitored daily. Although the hypopyon gradually resolved, the vitreous haze worsened to 2+ in the following days. The visual acuity of the right eye dropped from 6/9 to 6/36. Vitreous tap and intravitreal antibiotic administration was suggested by the ophthalmologist but refused by the patient. One week after admission, anterior chamber cells improved to 3+ and the hypopyon disappeared. The subretinal abscess decreased in size, although the vitreous haze remained the same.

Fine-needle aspiration of the liver abscess under ultrasound guidance was performed. Culture of pus from the abscess grew abundant *K pneumoniae* with the same sensitivity pattern as the blood isolate. Microscopy showed the presence of polymorphs and absence of amoebic parasites. Amoebic serology was negative. The patient became afebrile after 2 weeks of treatment with systemic antibiotics. Clinically, there were no other sites of haematogenous metastasis.

Anterior chamber and vitreous tap together with intravitreal antibiotic administration of vancomycin 1 mg in 0.1 mL and amikacin 0.4 mg in 0.1 mL were performed 2 weeks after admission because of the persistent vitreous inflammation, despite the decreasing size of the subretinal abscess. Both the anterior chamber and vitreous tap were negative for bacterial and fungal growth. The patient's vision continued to improve. One month after admission, the visual acuity in his right eye was 6/24. The subretinal abscess disappeared but the vitreous haze of 2+ persisted. At 3 months, traces of vitreous opacities together with a chorioretinal scar were noted in his right eye and the visual acuity improved to 6/12 in this eye.

Discussion

Septic metastatic endophthalmitis (also known as endogenous endophthalmitis) is a rare entity that accounts for 2% to 15% of all cases of endophthalmitis, which itself occurs at an average annual incidence of about 5 in 100 000 hospitalised patients.[6] Endogenous endophthalmitis is defined as the infection of

intraocular tissue resulting from the haematogenous spread of organisms to the eye. Exogenous endophthalmitis, a well-recognised complication of intraocular surgery and penetrating ocular trauma, is more common than endogenous endophthalmitis.

Metastatic septic endophthalmitis can occur at any age, ranging from 1 week to 85 years.[7] Bilateral involvement is seen in 14% to 25% of patients.[1,2,7,8] Interestingly, reports have shown a higher incidence of involvement of the right eye versus the left eye in patients with unilateral disease, presumably because of the more proximal and direct arterial blood flow to the right carotid artery.[1-4] There is no sex preponderance.

The majority of patients who develop endogenous endophthalmitis have a variety of associated predisposing conditions. Several studies have shown diabetes mellitus to be the most common association.[1-3,5,8] The prevalence of diabetes mellitus in one series was in the range of 60% to 90%.[1,3,9] Perhaps this can be explained by neutrophil dysfunction and loss of integrity of the normal host defence barrier, frequently associated with diabetes mellitus. Other medical associations include urinary tract infection, intra-abdominal endocarditis, meningitis, pneumonia, gastrointestinal malignancy, invasive procedures, and intravenous drug abuse.

In the past, endogenous endophthalmitis caused by *K pneumoniae*, an enteric gram negative bacillus, was considered to be rare, and was reported in approximately 100 patients before the mid-1980s.[1] Since then, more than 40 cases have been described, mainly in Taiwan, with 68% of patients having suppurative liver disease and 16% having urinary tract infection as the primary focus of infection.[9] Other primary foci of infection include pneumonia, peritonitis, and meningitis.[9] *Klebsiella pneumoniae* liver abscess associated with septic metastatic lesions is almost unique to Taiwan.[3,9] Endogenous endophthalmitis occurred in up to 7.8% of patients with *K pneumoniae* bacteraemia complicating pyogenic liver abscess.[5]

The visual outcome of endogenous endophthalmitis caused by *K pneumoniae* was worse than 'counting fingers' vision in more than 80% of patients with affected eyes in most series.[2-5] In contrast with previous reports, the patient in this study was a non-diabetic with good past health. The visual acuity of his affected eye was relatively preserved throughout the course of the disease, with a final visual acuity of 6/12. The fact that this patient did not have a fulminant course of endophthalmitis is interesting, and may be related to the virulence of the bacteria, the fact that he was not diabetic, or that he had been treated promptly, and other host factors.

Optimal therapy for endogenous endophthalmitis is controversial, especially regarding the role of vitrectomy and intravitreal antibiotics.[7] Although systemic antibiotics may have enhanced penetration due to breakdown in the blood-ocular barrier, they do not consistently achieve adequate intraocular bacterial inhibitory levels. Thus, the logic of using intravitreal antibiotics seems irrefutable. Retrospective analysis of outcome, however, suggests that intraocular antibiotic injection and vitrectomy may have a limited role in successful treatment.[7,8] Increasing resistance of *Klebsiella* spp. to antibiotics, such as first-generation cephalosporins, should be taken into account for the initial empirical therapy. A third-generation cephalosporin plus gentamicin may be useful. Wang et al[10] reported successful treatment of two patients with liver abscess complicated by septic endophthalmitis with parenteral ceftriaxone, which is the first antibiotic proven to penetrate the vitreous in therapeutic concentrations following systemic administration.

Hence, these authors suggested that ceftriaxone could be used as the drug of choice for the treatment of endophthalmitis caused by susceptible organisms. Vancomycin and amikacin were used empirically in accordance with the protocol of the ophthalmology department in this study.

There is often a delay in diagnosing endogenous bacterial endophthalmitis, particularly when there is no evidence of a primary infection.[6] Indeed, the ocular infection can be the initial manifestation of sepsis. Symptoms of ocular inflammation occur usually within 2 to 35 days (mean, 10.8 days) of systemic illness.[2] In the patient in this study, the primary focus of infection was obvious. Pyogenic liver abscess, however, often presents with features pointing neither to an abscess nor to the liver, thus posing a difficult diagnostic problem.

Conclusion

Endogenous endophthalmitis should be considered when a patient with pyogenic hepatic abscess or bacteraemia complains of ocular symptoms. Symptoms can often be subtle at the beginning. This complication rarely affects non-diabetic patients, as in the patient in this study. A better visual outcome for this patient, as compared with previous reports, may be related to prompt diagnosis and therapy.

References

1. Liao HR, Lee HW, Leu HS, Lin BJ, Juang CJ. Endogenous *Klebsiella pneumoniae* endophthalmitis in diabetic patients. Can J Ophthalmol 1992;27:143-7.
2. Chou FF, Kou HK. Endogenous endophthalmitis associated with pyogenic hepatic abscess. J Am Coll Surg 1996;182: 33-6.
3. Cheng DL, Liu YC, Yen MY, Liu CY, Wang RS. Septic metastatic lesions of pyogenic liver abscess. Their association with *Klebsiella pneumoniae* bacteremia in diabetic patients. Arch Intern Med 1991;151:1557-9.
4. Liu YC, Cheng DL, Lin CL. *Klebsiella pneumoniae* liver abscess associated with septic endophthalmitis. Arch Intern Med 1986;146:1913-6.
5. Chiu CT, Lin DY, Liaw YF. Metastatic septic endophthalmitis in pyogenic liver abscess. J Clin Gastroenterol 1988;10: 524-7.
6. Okada AA, D'Amico DJ. Endogenous endophthalmitis. In: Jakobiec FA, Albert DM, editors. Principles and practice of ophthalmology. London: WB Saunders Company; 1994: 3120-7.
7. Greenwald MJ, Wohl LG, Sell CH. Metastatic bacterial endophthalmitis: a contemporary reappraisal. Surv Ophthalmol 1986;31:81-101.
8. Okada AA, Johnson RP, Liles WC, D'Amico DJ, Baker AS. Endogenous bacterial endophthalmitis. Report of a ten-year retrospective study. Ophthalmology 1994;101:832-8.
9 Margo CE, Mames RN, Guy JR. Endogenous *Klebsiella* endophthalmitis. Report of two cases and review of the literature. Ophthalmology 1994;101:1298-301.
10. Wang FD, Wang LS, Liu YC, Liu CY, Lin CL, Wong WW. Successful treatment of metastatic endophthalmitis. Case reports. Ophthalmologica 1989;198:124-8.